

## **I. Macroepigenetics Intervention Project**

The purpose of the macroepigenetic environmental education intervention is to reduce polychlorinated biphenyl (PCB) and mercury (Hg) exposures in the St. Regis Mohawk tribal community.

This project will develop a community based intervention program to reduce PCB and Hg exposures in the Mohawk population through the implementation of dietary changes designed to reduce adverse gene-environment interactions leading to the bioaccumulation of these toxic substances. The project will take place at Akwesasne, New York, 13655. The project relates to the Toxic Substances Control Act because it will attempt to control exposures to dangerous chemicals (e.g. PCBs and mercury) being released into our community and into our bodies that were not adequately regulated under environmental statutes. Exposures to these two toxic substances are associated with the development of type-2 diabetes and neurodevelopmental disorders, two disease conditions of which our people disproportionately suffer. In carrying out this project we will work with the following partners through cooperative Memorandum of Agreements (MOAs):

- University of Albany, NY
- Food Ingredient and Health Research Institute, CA
- Running Strong for American Indian Youth, DC

## **II. Environmental and/or Public Health information about the Affected Community**

The St.Regis Mohawk Tribal community (Mohawks of Akwesasne) is a Native American community of approximately 15,000 people located along the St. Lawrence River at the juncture of New York, Ontario and Quebec at Akwesasne, NY, 13655. It directly abuts the General Motors Foundry Site, a National Priority Superfund Site. This facility used Aroclor 1258 (Monsanto Industrial Chemical Co., St. Louis, Missouri) in the hydraulic fluid in die-casting machines from 1959 to 1974. In addition, two New York State Superfund sites, the Reynolds Metal Company and ALCOA Aluminum facilities are nearby and immediately upriver. These three sites, all aluminum foundries, have contaminated the St. Lawrence and its three river tributaries with PCBs, which have entered the local food chain. Some local species of fish, birds, amphibians and mammals have levels that exceed the US Food and Drug administration's tolerance limits for human consumption (Sloan and Jock 1990). PCBs and other persistent organic pollutants (POPs) have contaminated the local environment, and high levels of POPs have been reported in local animal species (Forti et al. 1995; Lacetti 1993; Skinner 1992; Sloan and Jock 1990). A recent study (Amoniv 2014) co-authored with the Akwesasne Task Force on the Environment reports that "Living near a site contaminated with PCBs will result in inhalation of vapor phase PCBs continuously, although this will vary with season and temperature." Hospitalization rates for diabetic individuals living near PCB-contaminated hazardous waste sites in New York State are elevated (Kouznetsova et al 2007).

Mohawk parents are also deeply concerned about the release of mercury into the atmosphere from coal-burning plants of the midwest and Appalachia and the relationship of these exposures in the upwind air plumes of emissions we breathe to developmental outcomes in their children. The St.Regis Mohawk Tribe has responded to their concerns by implementing the Respite Autism Project under its Community and Family Services Division to support the increasing diagnosis on the Autism spectrum. There is a clear need to support nutritional interventions in the development of individualized programs for each child.

Data from human health studies done with Dr. Carpenter and others over the past 20 years have created great concern over health impacts in our young people from exposures to PCBs. Mohawk adolescents' average PCB levels were between the 90<sup>th</sup> and 95<sup>th</sup> percentiles of the US reference sample (Schell and Gallo, 2010). When these adolescents were young adults, 4 years later on average, levels of the sum of 14 PCB congeners found in 50% or more of the sample ( $\Sigma$ PCB50) were more than twice the average for the US as described by the CDC (Gallo et al., 2011). Consumption of locally caught fish and game was associated with higher levels of PCBs. Data from a 2005 multi-chemical exposure analysis of a cohort of 138 Mohawk girls aged 10 to 16.9 years of age suggests that the attainment of menarche may be sensitive to relatively low levels of lead and certain PCB congeners (Denham, 2005). Results from Schell (2004, 2008) find that young Mohawk adults with a blood marker of autoimmune activity (anti-thyroid peroxidase antibody) had higher PCBs; PCBs and lead are altering the development of the reproductive system and that PCB levels are related to reduced activity of the thyroid gland. Autoimmune problems as well as reduced activity of the thyroid gland and system are related to difficulty in reproduction. A study of dietary patterns of Akwesasne Mohawk adolescents found that 81% of females were below the RDA for calcium, 29% for phosphorus and 35% for folate, reflecting the lack of social and economic power that Mohawk girls, women and their communities possess. The loss of low-cost food sources such as produce from gardens and locally caught fish due to environmental contamination has greatly impacted food choices already constrained by socioeconomic inequalities.

The reproductive health of Mohawk adolescents and young adults is a major determinant of their future wellbeing. Preliminary data from the Akwesasne Women's Reproductive Health Study (2009-2014) finds that only 35 of 124 participants, ages 18-37, have typical menstrual cycles (28%). Atypical estradiol and progesterone rises in the luteal and follicular phases characterize the menstrual cycles of the remaining women, indicating sub-fertility due to anovulatory cycles and impaired menstrual function. Other clinically significant results include 88% of women with depressed HDL levels, 49% with elevated LDL, very high triglyceride levels overall, higher risk for diabetes or other auto-immune diseases due to very high glucose levels and high anti-thyroid peroxidase antibodies (TPOAb).

Risk of exposure to environmental contaminants such as PCBs is related to larger political and economic factors that often place minority communities in close proximity to local industries and point sources of pollution. Because of these structural inequities, tribal jurisdictions are attractive to corporations seeking a lesser degree of environmental regulation, oversight, and enforcement than are imposed by state governments. Due to current social and structural inequalities, tribal

communities seeking environmental justice often experience barriers to their participation in prescribed environmental decision-making processes ([Cole and Foster 2001](#)). Environmental mitigation is significantly behind that of non-tribal communities ([U.S. EPA 2004](#)), one reason is that the system of federal environmental and Indian law is insufficient to protect indigenous communities from environmental contamination.

Moreover, cultural practices at the local level can differentially allocate risk within a community. Traditionally, the Mohawk's diet relied heavily on fish. However, fish consumption has been reduced substantially following the release of advisories against eating any local fish issued by the St. Regis Mohawk Tribe Environment Division and reinforced by New York State in 1989 and 1991.

### **III. Organizations's Historical Connection to the Affected Community**

In 1987, three studies were initiated to examine the effects of pollution on human health, wildlife and fish in Akwesasne. The three studies were part of a risk-assessment study co-sponsored by the New York State Department of Health and General Motors. The breastmilk study was the first to take a serious look at the extent of the toxic effects of PCB exposure. It was during this transitional phase that the Tribe increased efforts to secure funding and hire additional staff. Through negotiations with the Environmental Protection Agency (EPA), the Tribe was able to create two programs that specifically dealt with clean water and clean air quality.

By 1990, the SRMT Environment Division had gained much ground in the fight to clean up the water, soil and air of the Mohawk Territory. The community was awakened to the real risks associated with toxic waste and the deteriorating effect it was having on the culture as a whole. Eventually self-reliant, the Division was able to do its own environmental sampling, monitoring and assessing. It also developed a multi-media program that helped assess and examine the community's environmental needs and concerns. (*Swamp, Winds of Change, 1996*)

As the Environment Division evolved to being one of the most advanced tribal environmental departments in the nation, the communities' involvement has been a critical component in the development of the water and quality standards. From a culturally standpoint, community involvement has coincided with the protection of all aspects of our natural surroundings including water, air, soil, fish, wildlife and forests. Specifically, public meetings with USEPA, NYSDEC, General Motors, Alcoa and other stakeholders have been well attended and have spawned other community/environmental concerns unrelated to the Superfund sites.

#### **IV. Project Description**

Building on the success achieved by the Fort Peck Indian community in using the macroepigenetic approach (Dufault et al., 2012) to determine how to reduce mercury exposures, we would like to expand the approach to determine how to reduce PCB and Hg exposures in our community. In the Fort Peck Indian community, a 10-week online macroepigenetics intervention course was used by the Fort Peck Community College to facilitate dietary changes that led to lower mercury exposures in the students who took the course compared to students who did not complete the course (Dufault et al., 2014). In addition, all participants in the Fort Peck study which was funded by EPA's Tribal ecoAmbassador Program significantly reduced one or more risk factors for Type-2 Diabetes (T2D). To accomplish our goal of determining an effective intervention to reduce both PCB and Hg exposures in our community, we will use the seven elements of EPA's Collaborative Problem Solving (CPS) Model to create programmatic shifts that incorporate macroepigenetic principles into a sustainable environmental education intervention program to foster the development of healthy mind, body, and spirit.

In addition we will utilize a Search Conference process in bringing stakeholders together to address the question: "What would a good mind, body, and spirit do to improve the environment of Akwesasne?" During the Search Conference process stakeholders will form a vision for community capacity building, issue identification, and strategic goal setting. As Mohawks of Akwesasne, we will work from a traditional consensus building framework. We will build on existing stakeholder partnerships and leverage our resources. We understand that before we complete any of the tasks in this work plan we will need to complete a Quality Assurance Project Plan (QAPP) and that EPA will provide guidance. Once the QAPP plan is approved, the following activities or work plan tasks (with the target dates of completion) will be implemented:

##### **TASK 1 (Sept. 2014). Designate Project Officer and form a steering committee. -**

The Project Manager, will designate Liaison Katsi Cook with Running Strong for American Indian Youth (RSFAIY) to serve as Project Officer (PO) and steering committee chair. The PO will facilitate communication between the SRMT leaders, the Project Manager, and community members for the purpose of carrying out the Macroepigenetics Intervention Project (MIP) and achieving the goal of implementing an intervention to successfully reduce PCB and Hg exposures. Steering committee members may include healthcare staff, educators at the school, tribal environmental protection staff, concerned citizens, and representatives from collaborating organizations such as the Dr. David Carpenter, MD, University of Albany (DCUA) and scientist volunteers with the non-profit Food Ingredient and Health Research Institute (FIHRI). The committee will be involved in scheduling events (e.g. public meetings, workshops, focus groups, intervention course dates), identifying targeted audiences, and conducting outreach to maximize public participation in the process of identifying the issue and building the community's capacity to address the issue. The committee will also be the focal point for any disputes that may arise and responsible for resolving these conflicts. The committee will be responsible for responding to community concerns or ideas regarding the intervention project. The role of the committee will be published in the local newspaper and on the SRMT's website. It will meet on a monthly basis and as needed throughout the project. The committee will also be responsible for developing

any supports needed along the way to ensure the project's success. Local collaborators will attend in person with others joining in by teleconference. A record of meeting minutes will be maintained on the Tribes' website.

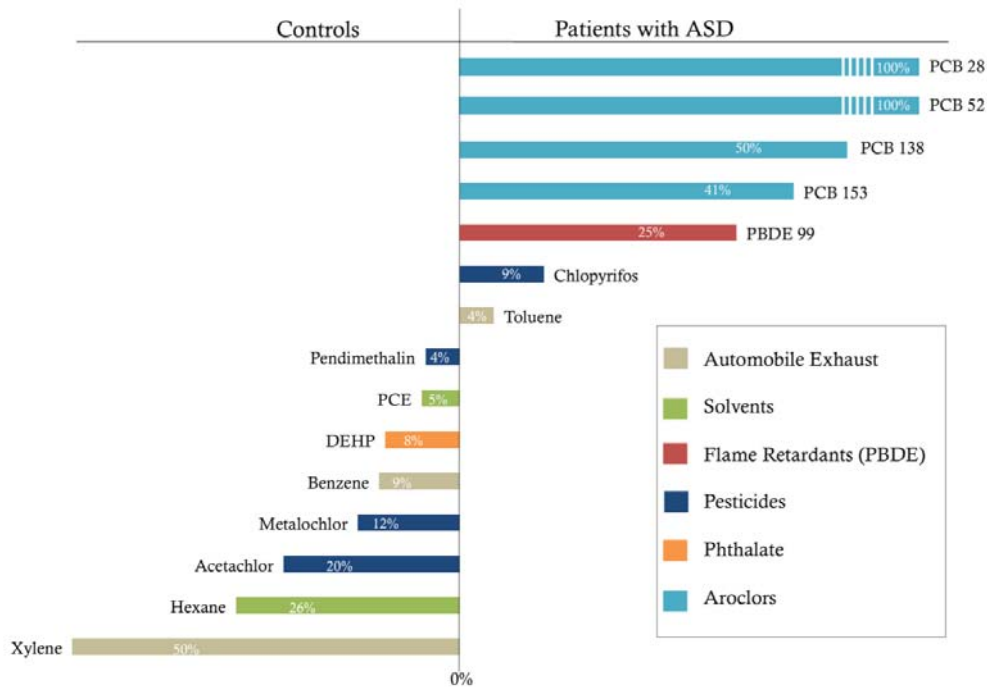
**TASK 2. (Sept. 2014) Solidify stakeholder partnerships via contract mechanism and attendance at EPA kickoff meeting.**- Regardless of whether or not money is exchanged, a Scope of Work (SOW) will be prepared and a contract signed by the collaborators, FIHRI, DCUA, and RSFAIY as agreed to in the attached MOAs. At least two collaborators (one from FIHRI and one from RSFAIY) will attend the EPA kick-off meeting.

**TASK 3 (Early to Mid Oct. 2014). Hold a community public meeting -** Prior to the meeting date, announcements will be run by the SRMT on the radio, the Tribe's web page, Face Book page, and in the local newspaper to encourage community attendance. At the meeting hosted by SRMT and sponsored by RSFAIY, community members will be informed of the problem of elevated PCB and Hg exposures, the role of these exposures in adverse health impacts, and the steps the SRMT is taking to address the problem. The MIP will be introduced with the collaborators and the public will be invited to attend a series of three 90-minute workshops sponsored by FIHRI, SRMT, and RSFAIY to learn about the following topics: 1) Macroepigenetics, 2) Results of the Fort Peck intervention project, and 3) Components of the 10-week online macroepigenetics intervention course and its planned use in the Mohawk community. Attendees will be asked to sign an attendance sheet and provide their contact information.

**TASK 4. (Oct. 2014). Conduct workshops & focus groups.**- Prior to each workshop series, SRMT and the PO will send out an announcement flyer to members of the targeted audience. In addition, the dates and locations of the workshops will be posted on the SRMT's website and Face Book pages. Three consecutive workshops will be presented by FIHRI's Environmental Health Educator, Renee Dufault in collaboration with RSFAIY as described in Task 3. The workshop series may be conducted by FIHRI and RSFAIY for different audiences to include the public, the SRMT's environmental protection program staff, senior citizens' center, educators and parents at the schools, and healthcare staff at the clinic. A focus group will be held after each workshop to solicit feedback from the attendees. The feedback will be used to tailor the proposed intervention course and any supports to the needs and desires of the Mohawk community.

During the workshop series, the community members will learn how dietary and environmental factors (e.g. PCB and Hg exposures) interact to create disease conditions (e.g. autism, ADHD, diabetes, heart disease). In the first macroepigenetics workshop, graphical images will be used to convey the message in layman's terms that PCB and Hg exposures are associated with the development of neurodevelopmental disorders and diabetes. For example, the chart below provided by FIHRI scientist and laboratory analysis director, Dr. Skip Kingston, shows the results of a recent study he conducted with other collaborators. PCBs were detected in the blood of 100% of the children in the study with the neurodevelopmental disorder "autism." Compared to the control group of children without the diagnosis of autism, this finding showed a significant difference. The manuscript explaining the results of the study is now in peer review and will explain that PCB exposures are associated with autism spectrum disorder (ASD).

Relative percent differences in the number of children having a detectable toxin level



During the second workshop in the series, community members will hear about the results of the Fort Peck study from the lead FIHRI investigator, Renee Dufault. During this workshop, the community will be introduced to the idea of using online education to address the PCB and Hg exposure issue. During the third workshop, community members will be introduced to the FIHRI online intervention tool and provided with snapshots of the curriculum content (e.g. activities, discussion board, video links, PowerPoints). Attendees at each workshop will be asked to sign in on an attendance sheet and provide their contact information. Ideally community members will participate in all three workshop topics and the focus groups immediately following. Publicity efforts will be documented for the record.

**TASK 5. (Early Nov. 2014) Collaborate with FIHRI to tailor intervention course.** FIHRI's Environmental Health Educator, Renee Dufault will tailor the online intervention course in response to the focus group feedback. For example, text may be modified and pictures added to reflect Mohawk culture. Any videos made available by the tribe will be incorporated into the content.

**TASK 6. (Nov. 2014). Develop supports to accompany FIHRI intervention course.** - Based on feedback provided by community members during the focus groups, supports will be developed by the Steering Committee to ensure the participants who test drive the Tribe's intervention course will have what they need to successfully complete it. The steering committee will work together to develop these supports by leveraging and sharing resources. Thirty members of the community will test drive the ten week intervention course. They will be recruited after the intervention protocol receives approval by the Tribe's Institutional Review Board (IRB).

**TASK 7. (Early Dec. 2014). Write protocol for education intervention study.** In accordance

with the MOAs, the tasks associated with obtaining IRB approval for the study will be carried out with FIHRI taking the lead but collaborating closely with SRMT, DCUA, and RSFAIY. SRMT has participated in a number of studies involving our community members. We have our own IRB. The Project Manager and all of the collaborators are well versed in the principles involved in protecting the rights, welfare, and wellbeing of humans involved in research. The Project Manager and collaborators will review the protocol, support tools, and recruiting materials prior to submission to the IRB.

**Our proposed intervention is an education intervention focused on reducing exposures to PCBs and Hg.** We will be giving our people environmental education using the macroepigenetic approach that we hope will empower them to make changes in their diet. Based on the Fort Peck results, we believe these dietary changes will enable our people to reduce their PCB and Hg levels and these reductions will result in fewer gene-environment interactions leading to the development of diabetes and other diseases disproportionately prevalent in our community. A copy of the protocol, recruitment materials, and support tools will be provided to the EPA project officer.

With the Survey Monkey tool already embedded in the online macroepigenetics education course we will be able to measure the dietary changes our people make as a result of their participation in the intervention course. Fifteen community members will test drive the course initially and serve as a “test” group. Fifteen additional community members will take the course later as a “delayed control group.” The course will be offered twice. The “test” group will take it first. All 30 community members will donate blood at the same time at two different points in time - prior to and after delivering the first course of instruction.

From blood samples donated by the small cohort participating in the testing phase of the intervention (30 community members), we will be able to determine if dietary changes made by the participants result in reductions in the levels of six PCB isomers, and organic and inorganic Hg. EPA will be provided with the findings of the study in the first annual progress report. **EPA grant monies will NOT be used to collect blood samples.**

The Project Manager, RSFAIY Liaison/Project Officer, FIHRI Educator and anyone else having direct involvement with the participants in our study will take and pass the free 4-5 hour NIH Good Clinical Practice (GCP) online training course to ensure compliance with Federal regulations governing the protection of human participants in studies such as ours (45 CFR, the Common Rule). Copies of the training certificates will be provided to EPA.

**TASK 8. (Mid January 2015). Conduct second round of workshop.** - Upon IRB approval of the study protocol, a second round of workshops will be conducted by FIHRI and RSFAIY as outlined in Task 4 except this time there will be no focus groups following each workshop. The purpose of the second round is to continue to educate the community members and build consensus around the idea of participating in the intervention study. The workshops will be widely publicized and at least two series will be delivered to targeted audiences requested by the Steering Committee. Using the workshop vehicle, thirty (30) community members will be recruited to participate in the intervention study. The individual participants will be paid a stipend by the SRMT for their successful participation.

Each participant will need to meet the following inclusion criteria: 1) Participants must be at least 21 years of age; 2) Participants cannot be on any medication except birth control; 3) Participants must have access to a computer and the Internet; 4) Participants must be willing to donate their blood to the SRMT's health clinic for PCB, Hg, and Glucose analyses. 5) Participants must be willing to provide their weight and height measurements to the SRMT's health clinic. The population targeted for recruitment is the younger adults in our community because the purpose of facilitating dietary changes to reduce exposures to PCB and Hg is to prevent disease conditions such as diabetes and neurodevelopmental disorders. Once the participants have enrolled in the study, they will be asked to donate their blood at the community health clinic where they will also allow their weight and height measurements to be taken by the nurse.

**TASK 9. (Mid February 2015 - May 1, 2015 ). Implement first online macroepigenetics intervention course with survey tool.** - In accordance with the attached MOA, the FIHRI educator will deliver the first online macroepigenetics course to the fifteen members of the "test group." The Survey Monkey instrument will be administered online to the participants prior to beginning and immediately after completing the ten week intervention course. The data collected by the survey will be used to track specific dietary changes. The same survey tool was used to successfully track the dietary changes in the successful Fort Peck study (Dufault et al., 2014). Participant completion and dropout rates will be reported to EPA in the first annual report along with any changes in diet.

**TASK 10. (Mid February 2015 and End of April 2015) Arrange for the shipment of donated blood samples.**- SRMT's designated PO will facilitate the communication between the health clinic staff and FIHRI collaborators to ensure the donated blood samples are properly sent to FIHRI scientist Dr. Kingston at Duquesne University (DU) for PCB and Hg analysis. Dr. Kingston will provide shipping instructions as part of the QAPP. Upon arrival to DU, the samples will be stored in accordance with the QAPP prior to analysis. Receipts for shipping costs and delivery confirmation records will be kept in the project file.

**TASK 11. (Mid February 2015 and End of April 2015). Coordinate measurements at two points in time as determined by the IRB approved protocol.**

Height and weight measurements are needed to calculate body-mass-index (BMI). Weight and BMI may be risk factors for Type-2 Diabetes. To determine if the online intervention is an effective tool in facilitating changes in diet that lead to improvements in risk factors associated with the development of Type-2 Diabetes, the designated PO will facilitate the communication between the health clinic staff and the thirty participants so that the IRB approved measurements [e.g. glucose levels, weight and body-mass-index (BMI)] are carried out successfully prior to the start and at the end of the intervention..

**TASK 12. (May 2015). Analyze donated blood samples for PCB and Hg levels.**

In accordance with the MOA with FIHRI, the donated blood samples will be analyzed by Dr. Kingston and the results will be forwarded to SRMT's designated PO in compliance with the IRB protocol.

**TASK 13. (June 2015) Using statistical analysis, evaluate the data collected during the study to determine the effectiveness of the intervention in achieving the goal to reduce PCB and Hg exposures and reduce risk factors associated with the development of Type-2 Diabetes (e.g.**



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SRMT Project Manager and the designated PO will work with DCUA, and FIHRI scientists to evaluate the data to determine if the intervention was successful at achieving the primary goal of reducing PCB and Hg exposures and the secondary goal of achieving dietary changes leading to reductions in risk factors associated with the development of Type-2 Diabetes. Dr. David Carpenter (DCUA) and the FIHRI scientists are experienced in data evaluation using statistic tests. Dr. Carpenter has published numerous studies using statistic tests and will provide consultation in interpreting the findings and reviewing the statistical analysis as outlined in the MOAs. Dr. Steven Gilbert, a FIHRI scientist and toxicologist has published numerous studies and used statistics to interpret findings. The attached resumes provide evidence of their experience.

**TASK 14. (March 2015, Sept. 2015, March 2016, Sept. 2016)** Write annual and semi-annual reports on the progress being made by the project. SRMT's designated PO will work with FIHRI collaborators to develop the semi-annual and annual progress reports required by EPA. The FIHRI and DCUA collaborators all have direct experience either working for or with EPA on other projects and can provide assistance as needed to complete this task in a timely manner.

**TASK 15. (July 2015, August 2016).** Develop PowerPoint presentations. The PO will work with FIHRI and DCUA collaborators to develop a power point presentation to disseminate the project findings each year of the study.

**TASK 16 (Fall 2015).** Conduct lessons learned focus groups. The FIHRI Environmental Health Educator and PO will conduct a focus group comprised of the participants in the first intervention course to get feedback on how to improve the intervention for delivery to the second "delayed control group" consisting of the other fifteen participants in the study. In addition, another focus group will be conducted made up of members of the steering community to discuss lessons learned, identify best practices, and explore the feasibility of delivering the intervention online at the SRMT's Diabetes Center of Excellence website.

**TASK 17 (November 2015).** Write one manuscript to disseminate lessons learned and findings of SRMT intervention study.- SRMT's designated PO will collaborate with the FIHRI scientists and Dr. David Carpenter to write a manuscript for publication in a peer reviewed open access journal. The purpose of the publication would be to disseminate the findings of the study. The attached resumes provide evidence of the collaborator's experience.

**TASK 18. (January 2016 - March 2016 ).** Implement second online macroepigenetics intervention course with survey tool. - In accordance with the attached MOA, the FIHRI educator will deliver the second online macroepigenetics course to the fifteen members of the "delayed control group." The Survey Monkey instrument will be administered online to the participants prior to beginning and immediately after completing the ten week intervention course. The data collected by the survey will be used to track specific dietary changes. The same survey tool was used to successfully track the dietary changes in the successful Fort Peck study (Dufault et al., 2014). Participant completion and dropout rates will be reported to EPA in the first annual report along with any changes in diet.

**TASK 19. (Summer 2016).** Develop a plan for ensuring the intervention remains available if it is found to be effective at reducing PCB and Hg levels.

The designated PO will work with the steering committee to develop a plan that when implemented will ensure resources are available to maintain the community's capacity to deliver the online intervention course locally through a website owned and operated by the SRMT. For example, the online curriculum tailored to meet the needs of the Mohawk community could be rebuilt by FIIHRI on the SRMT's Diabetes Center of Excellence website and taught by a community member who has demonstrated scholarship excellence while successfully completing the course.

**TASK 20. (Spring 2015). Sponsor SEARCH Conference.**

The designated PO will work with a community stakeholder group to deliver a participative process that will enable a large group of 50 community stakeholders to collectively create a community vision for issue identification, vision and strategic goal-setting as part of the process which utilizes the elements of the Community Problem Solving Model. Together participants will create plans for the future, based on shared ideals that they can live and work for. Because the resulting vision is created collectively, commitment and enthusiasm for action is very high. The SEARCH conference will bring together the people who hold critical pieces of the puzzle regarding the community's future. Participants will be drawn from a cross section of community reference groups such as cultural groups, social groups, health care, elders, youth, environmental programs, sports programs, faith communities, business owners, etc. in a participatory, democratic planning process that builds social ties and creates synergy that characterizes the Community Health Governance Model. The Search Conference will be scheduled for 2.5 days, including two evenings with meals provided to generate ownership, commitment and action.

**SRMT Partnerships**

**Dr. David Carpenter, MD, University of Albany (DCUA)**

Dr. Carpenter is a public health physician whose major interest is in studying the human health effects of exposure to environmental contaminants. He has worked with the SRMT on the specific issue of health effects of PCBs for more than 20 years, having served as the Principal Investigator of the multi-project Superfund Basic Research Program between 1988 and 2000. In conducting his research with the SRMT, he has developed a great understanding of the PCB exposures in our community. At the University of Albany, Dr. Carpenter is the Dean of the School of Public Health and directs all activities associated with the Institute for Health and the Environment. For this project, Dr. Carpenter will provide technical assistance for the activities associated with the PCB analysis, including the identification of PCB isomers to be tested and the interpretation of the results. He will also provide assistance as needed in completing the tasks outlined in the attached Memorandum of Agreement. Such tasks include participating in the steering committee meetings via teleconference call, reviewing the protocol, statistical analyses of data, contributing to the development of a manuscript of publication. These services outlined in the MOA will be provided as in-kind services to demonstrate Dr. Carpenter's continued commitment to improving health outcomes for the Akwesasne people of the SRMT.

## Running Strong for American Indian Youth, First Environment Collaborative

Running Strong for American Indian Youth's (RSFAIYs) First Environment Collaborative (FEC) program has committed to providing staff to work with SRMT for the duration of the project to broaden the participation of the Akwesasne people in community problem solving using critical elements of the EPAs CPS problem solving model. FEC Program Director and Founder, Katsi Cook, will serve as the SRMT's PO and Liaison for the intervention study. In these roles, she will chair the SRMT's steering committee and ensure all tasks are implemented to carry out the work plan described above. Katsi Cook has previous experience participating in a steering committee in the SRMT community. In her position at FEC, Katsi Cook worked with a steering committee to establish the St. Regis Mohawk Health Services Centering Pregnancy Program based on the empowerment model of providing group prenatal health care. In establishing this program, Akwesasne women are now provided with physical assessment, education, and peer support in a group setting to build a supportive community that stabilizes and nourishes the women as they progress in their development to becoming mothers.

Katsi Cook is a member of the SRMT and has a vested interest in the survival of the tribe. As a midwife, she has delivered many babies in the Akwesasne community and witnessed the devastating effects of the PCB and Hg exposures suffered by the SRMT. In 1981, she initiated the first Mother's Milk Bio-monitoring Project in the United States.

As the PO for this study, Katsi Cook will assist in the recruitment, orientation, and mentoring of the MIP participants. Having already successfully completed the macroepigenetics intervention course, she is well equipped to provide mentoring and serve as a liaison between the SRMT, community members and the collaborators in the study. Working in alignment with SRMT divisions, programs, community organizations, community members and the EPA's Office of Environmental Justice, FEC will work to advance a theory of action to improve the chances of healthy birth outcomes in the Mohawk population with the goal of preserving Mohawk society and culture for present and future generations. FEC will also provide small grant funds that will enable the St. Regis Mohawk Health Services Centering Pregnancy program to engage in discussions with the SRMT's new Diabetes Center for Excellence. These funds will be used to sponsor the community meeting task described in the work plan section above. An attached MOA confirms the commitment of RSFAIY to partner with the SRMT on this project.

## Food Ingredient and Health Research Institute

The 501 (c ) (3) non-profit Food Ingredient and Health Research Institute (FIHRI) is committed to providing technical support for carrying out the tasks described in the above work plan in accordance with the attached MOA. The organization is involved in research that explains how what we eat (e.g. food ingredients, toxic substances, micronutrients) determines how our genes behave. The study of these gene-environment interactions is known as "macroepigenetics" (Dufault et al., 2012). FIHRI volunteers have partnered with other entities to conduct research and deliver tribal environmental health interventions. FIHRI's volunteer Executive Director and Principal Health Educator, Renee Dufault, was an

EPA tribal eco-ambassador two years in a row from 2011-2013 and worked with the American Indian Higher Education Consortium (AIHEC) and the Fort Peck Community College (FPCC) to develop and deliver a macroepigenetic nutrition intervention course online at the FIHRI website. The intervention course was implemented over ten weeks during which time Prof. Dufault provided instruction to college students at FPCC to help them make dietary changes leading to reductions in weight, body mass index (BMI), fasting glucose and blood mercury levels. Publication of a manuscript providing the results of the FPCC intervention study is pending in the Clinical Epigenetics Journal (Dufault et al., 2014). This project and study to be conducted in the Akwesasne community will build on the success of the Fort Peck project.

Prof. Dufault worked in collaboration with Katsi Cook of FEC and Dr. Carpenter and others in the past to participate in discussions on health disparities and produce a manuscript outlining Indigenous Peoples' concerns related to toxic substance exposures (Hoover et al., 2012). Renee Dufault has 17 years of experience developing and delivering environmental health education for tribes. She has repeatedly demonstrated her commitment and vested interest in improving health outcomes for Indian people over the years by participating in conferences focused on Indian issues sponsored by Tribes, EPA, and the Department of Interior. Prof. Dufault's resume is attached. She teaches the popular EPA funded Indian Country Environmental Hazard Assessment Project (ICEHAP) course online at the United Tribes Technical College which has served 61 land-based tribes and delivered 71 tribally generated work plans to EPA for the resolution of tribal environmental health problems. For this project, Professor Dufault will be responsible for providing instruction for the workshop series, conducting the focus groups with Katsi Cook, tailoring the online intervention course to meet the needs of the community, and providing instruction for the two planned intervention courses. These in-kind services will be delivered as part of the MOA.

FIHRI volunteer scientists, Dr. Skip Kingston and Dr. Steve Gilbert will collaborate with Dr. Carpenter and assist in the development or review of the required QAPP and protocol for the study design. Other FIHRI volunteer scientists will assist with data review and analysis. Dr. Skip Kingston is FIHRI's Laboratory Analysis Director and conducts his volunteer work out of his laboratory at Duquesne University where he is a professor of analytical chemistry. Dr. Kingston is an expert in creating methods of analysis and has many years of experience working with EPA on analytical method development. His resume is attached and includes a copy of a Certificate of Appreciation presented by EPA in 2013 for his assistance in improving the quality of analytical methods for the RCRA program. Dr. Skip Kingston has experience analyzing blood samples for both Hg and PCBs. He recently developed a new sensitive method of mercury analysis for the Centers for Disease Control and Prevention. Dr. Kingston will facilitate the analysis of the blood samples for PCB and Hg in accordance with the MOA and the funding provided therein.

## **V. Organizational Capacity and Programmatic Capability**

The Saint Regis Mohawk Tribe has in place the necessary systems to effectively manage Federal funds, having successfully applied, received and managed federal grant funds since 1980. The Tribe's Finance department draws down funds and each award is assigned to a bookkeeper to help track expenditures and to complete financial reporting. The Tribe has in

place a Grants and Contracts office to ensure all contractual obligations are adhered to for all grant awards. Overall, the tribe has vast experience in every facet of grants management and there is no apparent issue that would prevent it from effectively managing this cooperative agreement.

The Tribe has a long and strong relationship with the USEPA. Satisfactory project completion has been the norm with all of our EPA grants. Many of our grants require a timeline for completion which helps guide our progress. Going forward we anticipate meeting our stated objectives by following a similar schedule that allows for timely completion of each task and objective.

The basis for any grant program is a strong plan. This cooperative agreement will be no different in that we intend to follow the elements outlined in the work plan to address the public health issue facing this community. The experience the Tribe has managing grant funds coupled with the knowledge of our partners and the buy-in from our community should produce the intended results of the project.

The Saint Regis Mohawk Tribe, specifically its Environment Division has been addressing the impacts of hazardous waste contamination since the early 1980s. Since that time the Tribe's efforts have culminated in the improvement of air, water, soil, human health, fish, wildlife and forests as a result of its commitment to the protection of all the elements in the circle of life.

Meeting reporting requirements in the form of programmatic progress reports and financial reports have been consistently achieved for all of our EPA grant/cooperative agreements. Specifically, our *Saint Regis Mohawk Tribe Support Agency Assistance Related to the General Motors Superfund Site* (V-00295508-2) grant has been existence since 1995. Reporting has generally been completed by Craig Arquette, Project Coordinator.

## **VI. Qualifications of the Project Manager (PM)**

As the PM for this study, Beverly Cook will be the individual responsible for the technical completion of the proposed work. Beverly Cook is a licensed Family Nurse Practitioner (FNP) and has provided health care to the Akwesasne community for 29 years. She has participated in numerous environmental health studies since 1974, collaborating with Dr. David Carpenter and others. To date there have been 13 articles published in peer reviewed medical journals discussing the PCB exposures and adverse effects suffered by the Mohawk community members. In her role of providing health care as a FNP, she served as the Clinic Coordinator for the Akwesasne Women's Reproductive Health Study. The results of this study are currently in peer review.

Chief Cook lives in the Akwesasne community where she raised her children. She has worked at the St. Regis Mohawk Health Services since 1984 and was recently elected to the position of Tribal Council Chief in August of 2013. Past activities have included community education, cultural gatherings, conferences, workshops, and facilitating changes in the delivery of prenatal health care and the provision of services related to trauma.

## **VII. Past Performance in Reporting on Outputs and Outcomes**

SRMT Brownfields Tribal Response Program (RP-97221910-2) \$108,673, USEPA, Ken Jock;

St. Lawrence River Sturgeon Restoration Project (GL-97221410-1) \$723,107, USEPA, Ken Jock;

Lake Ontario Lakeside Management Plan Process (GL-97216711-1) \$185,877, USEPA, Ken Jock;

Breathing, Living, and Learning in the Akwesasne Community (EQ-96289113-0) \$29,717, USEPA, Ken Jock;

FY13 Exchange Network – Saint Regis Mohawk Tribe (OS-83546201-0) \$293,832, USEPA, Ken Jock;

All grant awards, whether EPA funded or not require evaluation to track progress towards intended goals. Project Managers, as required by the special terms and conditions in the Grant Award Notice, demonstrate sufficient progress towards completion of the project within the project period through quarterly reports submitted to their EPA contact.

## **VIII. Expenditure of Awarded Grant Funds**

The Saint Regis Mohawk Tribe has the programmatic capacity, policies and procedures, as well as the necessary financial controls in place to carry out the proposed project in the timeframe provided.

## **IX. Quality Assurance Project Plan (QAPP)**

Our project will require a QAPP because we will be collecting biological samples for analysis.